

5.0 SUMMARY AND RECOMMENDATIONS

The information provided in Section 3.0 of this draft EIS and summarized below for each resource category indicates that the proposed Keystone XL Project would result in limited adverse environmental impacts during both construction and operation, assuming that the Project would be constructed and operated in compliance with:

- All applicable laws and regulations;
- The provisions in Keystone's proposed CMR Plan (Appendix B);
- The environmental specifications and water quality protection requirements mandated by MDEQ for Montana, as part of the MFSA certification process and presented in Attachments 1 and 2 to Appendix I; and
- Other mitigation measures presented in this draft EIS.

The following subsections summarize the impacts expected to each resource area, the measures Keystone would incorporate into the Project to avoid or minimize impacts, as well as the recommended additional mitigation measures for each resource category.

Impacts and mitigations associated with potential leaks and spills of fuel, lubricating fluids, and crude oil during construction and operations are summarized in Section 5.13.

5.1 GEOLOGY

5.1.1 Summary

The proposed Project would not result in substantial long- or short-term, large scale alteration of topography. Routine pipeline operation and maintenance activities would not be expected to affect physiography or surface or bedrock geology.

Potential impacts to paleontological resources that could occur during construction of the Project and its connected actions include:

- Damage to or destruction of fossils due to excavation activities and/or blasting;
- Erosion of fossil beds due to grading; and
- Unauthorized collection of fossils by construction personnel or the public.

Routine pipeline operations and maintenance activities are not expected to affect paleontological resources. However, collection of these resources for scientific or other purposes would not be possible within the permanent ROW during project operations.

Based on the evaluation of potential seismic hazards along the proposed ROW, the risk of pipeline rupture from earthquake ground motion is considered to be minimal. The proposed route would not cross any known active faults and is located outside of known zones of high seismic hazard.

During construction activities, vegetation clearing and alteration of surface-drainage patterns could increase landslide risk. There is a risk of subsidence where the proposed route crosses karst formations in Nebraska, Oklahoma, and Texas. However, the overall risk to the pipeline from karst-related subsidence is expected to be minimal.

During Project operations, there could be risks associated with pipeline exposure due to lateral or vertical scour at water crossings during floods.

5.1.2 Planned Mitigation Measures

Keystone would prepare a Paleontological Mitigation Plan to be included in the FEIS, prior to beginning construction on federal and certain state and local government lands because there is potential for discovery of fossils during trench excavation and pipeline installation activities. Keystone would consult with the appropriate regulatory agencies in each state on the requirements for the Paleontological Mitigation Plan for federal and state lands.

To reduce landslide risk, Keystone would employ erosion and sediment control and reclamation procedures described in Section 4.11 of its CMR Plan (Appendix B). These procedures are expected to limit the potential for erosion, and maintain slope stability during the construction and operational phases of the Project.

Keystone would implement an Integrated Public Awareness (IPA) Plan which includes the distribution of educational materials to inform landowners of potential threats and information on how to identify threats to the pipeline including the potential for landslides.

To reduce the risk of subsidence, Keystone would conduct site-specific studies as necessary to characterize karst features, and would evaluate and modify construction techniques as necessary in these areas.

5.1.3 Additional Agency Proposed Mitigation Measures

There is currently an effort between DOS, BLM, and MDEQ and other agencies to develop a Memorandum of Understanding (MOU) for the identification, evaluation and protection of paleontological resources. This MOU will be completed prior to the ROD and will be added to the final EIS as an Appendix.

5.2 SOILS

5.2.1 Summary

Pipeline construction activities, including clearing, grading, trench excavation, backfilling, heavy equipment traffic, and restoration along the construction ROW could adversely affect soil resources. In addition, the construction of pump stations, access roads, construction camps and the tank farm could also affect soil resources. Potential impacts from the Project and its connected actions include:

- Temporary and short-term soil erosion;
- Loss of topsoil;
- Short-term to long-term soil compaction; and
- Permanent increases in the proportion of large rocks in the topsoil.

Pipeline construction also could result in damage to existing tile drainage systems. Special considerations and measures would be undertaken in the Sand Hills region due to the highly erodible nature of the soils in this area.

During the operational phase of the Project, small scale, isolated surface disturbance impacts could occur from pipeline maintenance traffic and incidental repairs. This could result in accelerated erosion, soil compaction and related reductions in the productivity of desirable vegetation or crops. Impacts related to excavation and topsoil handling would be limited to small areas where certain pipeline maintenance activities take place.

5.2.2 Planned Mitigation Measures

The CMR Plan proposes procedures designed to reduce the likelihood and severity of Project impacts, and mitigation where impacts are unavoidable. These include:

- Reducing soil erosion by installing sediment barriers (silt fencing, straw or hay bales, sand bags), trench plugs, temporary slope breakers, drainage channels or ditches, and mulching;
- Assigning an Environmental Inspector (EI) to each construction spread. The EI would have the authority to stop work and/or order corrective action in the event that construction activities violate the measures outlined in the CMR Plan, landowner requirements, or any applicable permit;
- Segregate and salvage all topsoil up to a maximum of 12 inches of topsoil from the area disturbed by trenching where practicable and restore topsoil to its approximate original stratum after backfilling is complete;
- Developing soil discovery procedures in consultation with relevant agencies to accommodate potential discoveries of pre-existing contaminated soils;
- Halting construction activities during the winter months on the Steele City Segment to prevent the need for winter construction techniques;
- Halting construction during wet weather periods, or implementing methods to mitigate impacts when construction activities are conducted in wet conditions;
- Repairing any ineffective erosion control measures within 24 hours of detection, where possible. If substantial precipitation or snowmelt events create erosion channels in areas where soil is exposed, additional sediment control measures would be implemented;
- Ripping to relieve soil compaction in particular areas from which topsoil has been removed;
- Scheduling construction during drier months of the year to reduce the potential for precipitation induced soil erosion impacts; and
- Identifying and avoiding or, where necessary, repairing or replacing drainage tiles that could be damaged by pipeline construction.

Additionally, Keystone is negotiating easement agreements with landowners and agencies that would require Keystone to restore the productivity of the ROW on pasture and range lands and provide compensation for demonstrated losses from decreased productivity resulting from pipeline operations.

5.2.3 Additional Agency Proposed Mitigation Measures

The following additional potential mitigation measures have been suggested by regulatory agencies:

- The creation of a site specific erosion control and revegetation plan for agency approval prior to the start of construction (MDEQ);
- Ripping of subsoils on range and pasture lands if requested by the landowner or land management agency (MDEQ); and
- Conduct ground patrols to detect and repair any differential settling or subsidence holes that develop over the life of the Project (MDEQ).

5.3 WATER RESOURCES

5.3.1 Summary

It is not anticipated that surface water or groundwater quality would be significantly affected by normal disposal activities such as disposal of hydrostatic test water. Floodplain terraces and low floodplains are found along the Project route. Two pump stations and 10 MLVs would be in the 100-year floodplain as currently proposed, but the effect of those facilities on floodplain function is expected to be minor.

Potential impacts to groundwater during construction activities of the Project and its connected actions include:

- Groundwater quality degradation during or after construction resulting from disposal of materials and equipment;
- Temporary increases in TSS concentrations where the water table is disturbed during trenching and excavation activities (drawdown of the aquifer is possible where dewatering is necessary);
- Increased surface water runoff and erosion from clearing vegetation in the ROW;
- Degradation of groundwater quality due to potential blasting; and
- Temporary increases in local groundwater levels due to infiltration of hydrostatic testing waters.

Potential impacts on surface water resources during construction activities include:

- Temporary to long-term surface water quality degradation during or after construction from disposal of materials and equipment;
- Temporary increases in TSS concentrations and increased sedimentation during stream crossings;
- Temporary to short-term degradation of aquatic habitat from in-stream construction activities;
- Changes in channel morphology and stability caused by channel and bank modifications;
- Temporary to long term decrease in bank stability and resultant increase in TSS concentrations from bank erosion as vegetation removed from banks during construction is re-establishing;

- Temporary reduced flow in streams and potential other adverse effects during hydrostatic testing activities; and
- Temporary degradation of surface water quality and alteration of aquatic habitat from blasting activities within or adjacent to stream channels.

5.3.2 Planned Mitigation Measures

To protect floodplain functions, the pipeline would be constructed under river channels with potential for lateral scour. In floodplain areas adjacent to waterbodies, the contours would be restored to as close to previously existing contours as practical and the construction ROW would be revegetated so that after construction, the pipeline would not obstruct flows over designated floodplains.

Keystone has committed to the following mitigation measures to protect water resources:

- Implementation of measures designed to reduce erosion and control surface water runoff during vegetation clearing in the ROW;
- File a blasting plan with applicable state or local jurisdictions, where required. Keystone's blasting plan would include provisions to avoid impacts to groundwater and to incorporate post-blasting testing for surface water and water wells within 150 feet of the centerline;
- Discharge waters would meet all water quality requirements prior to discharge. All applicable water withdrawal and discharge permits would be acquired prior to hydrostatic testing;
- Open-cut methods would be used at 38 major and sensitive waterbody crossings and as determined by the appropriate regulatory authority;
- Use the general river crossing procedures and mitigations included in the CMR Plan. The CMR Plan would be revised prior to construction to incorporate additional mitigations, as well as any other mitigations or conditions that the U.S. Army Corps of Engineers (USACE) imposes during final permit negotiations;
- Where the HDD method is not used for major waterbody crossings or for waterbody crossings where important fisheries resources could be impacted, Keystone would develop a site-specific plan addressing proposed additional construction and mitigation procedures;
- Prior to commencing any stream crossing construction activities, Keystone would obtain a permit under Section 404 of the Clean Water Act (CWA) through the USACE and Section 401 water quality certification as per state regulations;
- If required, Keystone would work with the applicable permitting agency to develop specific crossing and sediment handling procedures for contaminated or impaired waters.
- Keystone would develop specific construction and crossing methods for sensitive/protected waterbodies in conjunction with USACE and U.S. Fish and Wildlife Service (USFWS) consultation.
- Keystone would develop a frac-out plan in consultation with the regulatory agencies for HDD crossings.
- All contractors would be required to follow the identified procedures to limit erosion and other land disturbances including the use of buffer strips, drainage diversion structures, sediment barrier installations, and clearing limits, as well as procedures for waterbody restoration at crossings.

- Following completion of waterbody crossings, waterbody banks would be restored to preconstruction contours, or at least to a stable slope. Banks would be seeded with native vegetation, mulch, or erosion control fabric, where possible. If necessary, additional erosion control measures would be installed in accordance with permit requirements.
- All waterbody crossings would be assessed by qualified personnel in the design phase of the Project with respect to the potential for channel aggradation/degradation and lateral channel migration.
- All construction activities would comply with the National Pollutant Discharge Elimination System (NPDES) permit and other applicable permitting, including following the procedures in a Stormwater Pollution Prevention Plan.
- Hydrostatic test manifolds would be located more than 100 feet away from wetlands and riparian areas to the maximum extent possible.
- All surface water resources utilized for hydrostatic testing would be approved by the appropriate permitting agencies prior to initiation of any testing activities. Planned withdrawal rates for each water resource would be evaluated and approved by these agencies prior to testing.
- The water withdrawal methods described in the CMR Plan would be implemented and followed. These procedures include screening of intake hoses to prevent the entrainment of fish or debris, keeping the hose at least 1 foot off the bottom of the water resource, prohibiting the addition of chemicals into the test water, and avoiding discharging any water that contains visible oil or sheen following testing activities.
- Hydrostatic test water would be discharged to the source water at an approved location along the waterway or to an upland area within the same drainage as the source water where it may evaporate or infiltrate. Discharged water would be tested to ensure it meets applicable water quality standards imposed by the discharge permits for the permitted discharge locations.

5.3.3 Additional Agency Proposed Mitigation Measures

The following additional potential mitigation measures have been suggested by regulatory agencies:

- In Montana, avoid crossing water ponds and/or reservoirs (MDEQ);
- Avoid wet crossings of any stream, lake, reservoir, or pond in the state of Montana (MDEQ); and
- In Montana, any construction equipment and construction-related vehicles crossing a water body should use a crossing location that is within the dewatered reach created by the selected dry crossing construction method (MDEQ).

5.4 WETLANDS

5.4.1 Summary

The Project would disturb a total of 554 acres of wetlands, primarily forested wetlands (271 acres) and emergent wetlands (262 acres) as well as some scrub-shrub wetlands (21 acres). While emergent wetlands would regenerate quickly after disturbance (within 3–5 years generally), forested and scrub-shrub wetlands would potentially experience long-term effects. Wetlands in parks or reserves have high conservation value.

Potential impacts to wetlands during construction and operation of the Project and its connected actions include:

- Loss of wetlands due to backfilling or draining;
- Modification in wetland productivity due to modification of surface and subsurface flow patterns;
- Temporary and permanent modification of wetland vegetation community composition and structure from clearing and operational maintenance (clearing temporarily affects the wetland's capacity to buffer flood flows and/or control erosion);
- Wetland soil disturbance (mixing of topsoil with subsoil with altered biological activities and chemical conditions that could affect reestablishment and natural recruitment of native wetland vegetation after restoration);
- Compaction and rutting of wetland soils from movement of heavy machinery and transport of pipe sections, altering natural hydrologic patterns, inhibiting seed germination, or increasing siltation;
- Temporary increase in turbidity and changes in wetland hydrology and water quality;
- Permanent alteration in water-holding capacity due to alteration or breaching of water-retaining substrates in the Prairie Pothole and Rainwater Basin regions;
- Alteration in vegetation productivity and life stage timing due to increased soil temperatures associated with heat input from the pipeline; and
- Alteration in freeze-thaw timing due to increased water temperatures associated with heat input from the pipeline.

5.4.2 Planned Mitigation Measures

Keystone has committed to the following measures to protect wetlands in its CMR Plan:

- Avoid placement of aboveground facilities in a wetland, except where the location of such facilities outside of wetlands would preclude compliance with DOT pipeline safety regulations;
- Clearly mark wetland boundaries with signs and/or highly visible flagging during construction and maintain markers until permanent seeding is completed;
- Limit the width of the construction zone to 85 feet through standard wetlands, unless soil conditions require a greater width;
- Locate extra work spaces at least 10 feet away from wetland boundaries, where topographic conditions permit;
- Limit clearing of vegetation between extra work areas and the edge of the wetland to the construction right-of-way and limit the size of extra work areas to the minimum needed to construct the wetland crossing;
- Clear the construction right-of-way, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction right-of-way using wide-track or balloon-tire construction equipment and/or conventional equipment operating from timber and slash (riprap) cleared from the right-of-way, timber mats, or prefabricated equipment mats;
- Install and maintain sediment barriers at all saturated wetlands or wetlands with standing water across the entire construction right-of-way upslope of the wetland boundary and where saturated

- Limit the duration of construction-related disturbance within wetlands to the extent practicable;
- Use no more than two layers of timber riprap to stabilize the construction right-of-way;
- Cut vegetation off at ground level leaving existing root systems in place and remove it from the wetland for disposal;
- Limit pulling of tree stumps and grading activities to directly over the trench line unless safety concerns require the removal of stumps from the working side of the construction right-of-way;
- Segregate and salvage all topsoil up to a maximum of 12 inches of topsoil from the area disturbed by trenching in dry wetlands, where practicable and restore topsoil to its approximate original stratum after backfilling is complete;
- Dewater the trench in a manner to prevent erosion and to prevent heavily silt-laden water from flowing directly into any wetland or waterbody;
- Remove all timber riprap and prefabricated equipment mats upon completion of construction;
- Locate hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable;
- Perform all equipment maintenance and repairs in upland locations at least 100 feet from waterbodies and wetlands, if possible;
- Avoid parking equipment overnight within 100 feet of a watercourse or wetland, if possible;
- Prohibit washing equipment in streams or wetlands;
- Install trench breakers and/or seal the trench to maintain the original wetland hydrology, where the pipeline trench may drain a wetland;
- Avoid sand blasting in wetlands to the extent practicable, if unavoidable place a tarp or suitable material to collect as much waste shot as possible, clean up all visible wastes, and dispose of collected waste at an approved disposal facility.
- Remove all timber riprap, timber mats, and prefabricated equipment mats and other construction debris upon completion of construction;
- Replace topsoil, spread to its original contours with no crown over the trench;
- Remove any excess spoil, stabilize wetland edges and adjacent upland areas using permanent erosion control measures and revegetation;
- For standard wetlands, install a permanent slope breaker and trench breaker at the base of slopes near the boundary between the wetland and adjacent upland areas where necessary to prevent the wetland from draining;
- Apply temporary cover crop at a rate adequate for germination and ground cover using annual ryegrass or oats unless standing water is present (in the absence of detailed revegetation plans or until appropriate seeding season);
- Apply seeding requirements for agricultural lands or as required by the landowner for farmed wetlands;
- No application of fertilizer, lime, or mulch unless required by the appropriate land management or state agency;

- Restore wetland areas within conservation lands or easements to a level consistent with any additional criteria established by the relevant managing agency;
- Complete topographic surveys for USFWS easement wetlands prior to construction through the wetland, restoring final grades to within 0.1 foot of original elevations; and
- Prohibit use of herbicides or pesticides within 100 feet of any wetland (unless allowed by the appropriate land management or state agency).

5.4.3 Additional Agency Proposed Mitigation Measures

The following additional potential mitigation measures have been suggested by regulatory agencies:

- Wetland construction monitoring plans should be developed both before and after construction for depressional wetlands of the Prairie Potholes region in Montana and wetlands that no longer pond water after the pipeline is installed should receive additional compaction, replacement, or at the landowner's or managing agency's discretion compensatory payments should be made for drainage of the wetland (MDEQ).
- In areas of concern to NPS, any loss or impact to wetlands from pipeline construction should be fully mitigated by replacement or restoration of an equal or greater acreage in the immediate locale of the impact (NPS).
- Permanent impacts to forested wetlands in Texas should be calculated to include the total width of area where trees would be removed during long-term maintenance including any removal areas beyond the 10-foot wide maintained area. All forested wetland clearing is considered a permanent impact that would require compensatory mitigation (Texas Parks and Wildlife, TPW).
- The wetland mitigation plan should be developed in consultation with TPW, and TPW requests that Keystone address impacts to all wetland types in the wetland mitigation plan and mitigate for these impacts (TPW).

5.5 TERRESTRIAL VEGETATION

5.5.1 Summary

Terrestrial vegetation classes include all the wetland classes in addition to grasslands, upland forest, and developed land. Grassland impacts due to pipeline construction are expected to be minimal, and affected vegetative communities generally are expected to reestablish within 2 years. Impacts on upland forest and shrubland would be longer term than those anticipated for grassland because of the time required for these plant communities to reestablish and reach mature pre-construction conditions.

Potential impacts to terrestrial vegetation during construction and operation of the Project and its connected actions include:

- Temporary and permanent modification of vegetation community composition and structure from clearing and operational maintenance;
- Increased risk of soil erosion due to lack of vegetative cover;
- Expansion of invasive and noxious weed populations along the pipeline ROW as a result of construction and operational vegetation maintenance;

- Soil and sod disturbance (mixing of topsoil with subsoil with altered biological activities and chemical conditions that could affect reestablishment and natural recruitment of native vegetation after restoration);
- Compaction and rutting of soils from movement of heavy machinery and transport of pipe sections, altering natural hydrologic patterns, inhibiting water infiltration and seed germination, or increasing siltation; and
- Alteration in vegetation productivity and lifecycle due to increased soil temperatures associated with heat input from the pipeline.

5.5.2 Planned Mitigation Measures

To reduce impacts on vegetation within the construction and permanent ROW and to improve the probability of successful revegetation of disturbed areas, Keystone would implement the following measures in its CMR Plan:

- Limit construction traffic to the construction ROW, existing roads, and approved private roads;
- Clearly stake construction ROW boundaries including pre-approved temporary workspaces to prevent disturbance to unauthorized areas;
- Mow or disc crops if present to ground level unless an agreement is made for the landowner to remove for personal use;
- Prohibit burning on cultivated lands, as well as on rangelands and pastures when recommended by regulatory agencies;
- Limit the width of the construction ROW at timber shelterbelts in agricultural areas to the minimum necessary to construct the pipeline;
- Strip topsoil in cultivated and agricultural lands up to a maximum depth of 12 inches;
- Stockpile stripped topsoil in a windrow along the edge of the ROW, such that the potential for subsoil and topsoil mixing is minimized;
- Prohibit the use of topsoil as construction fill;
- Increase adhesion in topsoil piles by using water or an alternative adhesive agent if required to prevent wind erosion;
- Leave gaps in rows of topsoil and subsoil and prevent obstructions in furrows, furrow drains, and ditches to allow drainage and prevent ponding of water next to or on the ROW;
- Install flumes and ramps in furrows, furrow drains, ditches, and for any watercourse where flow is continuous during construction to facilitate water flow across the trench;
- Ramp bar ditches with grade or ditch spoil to prevent damage to the road shoulder and ditch;
- Restore original contours and drainage patterns to the extent practicable after construction;
- Survey agricultural areas with terraces such that pre-construction contours may be restored after construction;
- Use timber mats, timber riprap, or other methods to stabilize surface conditions when the construction surface is inadequate to support equipment and remove these mats or riprap when construction is complete;

- Provide and maintain temporary and permanent erosion control measures on steep slopes or wherever erosion potential is high;
- Install sediment barriers below disturbed areas where there is a hazard of offsite sedimentation;
- Install slope breakers (water bars) on slopes greater than 5 percent on all disturbed lands to prevent erosion;
- Apply temporary mulch on disturbed construction work areas that have been inactive for one month or are expected to be inactive for a month or more, using only weed free mulch;
- Limit vehicular soil compaction, and dig ditches to improve surface drainage, using timber riprap, matting or geotextile fabric overlain with soil, and stop construction when necessary to further limit soil compaction;
- Test topsoil and subsoil for compaction at regular intervals in agricultural and residential areas;
- Relieve soil compaction on all croplands by ripping a minimum of three passes at least 18 inches deep, and on all pastures by ripping or chiseling a minimum of three passes at least 12 inches deep;
- Relieve subsoil compaction on areas stripped for topsoil salvage by ripping a minimum of three passes at 18 inches or less followed by grading and smoothing (disc and harrow) to avoid topsoil mixing;
- Replace topsoil to pre-existing depths once ripping and disking of subsoil is complete up to a maximum of 12 inches;
- Alleviate compaction on cultivated fields by cultivation;
- Consult with NRCS if there are any disputes between landowner and Keystone as to areas where compaction should be alleviated;
- Plow under organic matter, including wood chips, manure, or planting a new crop such as alfalfa, to decrease soil bulk density and improve soil structure or any other measures in consultation with the NRCS if mechanical relief of compaction is deemed unsatisfactory;
- Inspect the ROW in the first year following construction to identify areas of erosion or settling;
- Apply soil amendments if agreed to by the landowner, such as fertilize and soil pH modifiers in accordance with written recommendations from local soil conservation authorities, land management agencies, or landowners and incorporate into the normal plow layer as soon as possible after application;
- Reseed the reclaimed construction ROW following cleanup and topsoil replacement as closely as possible using seed mixes based on input from the local NRCS and specific seeding requirements as requested by the landowner or the land management agency;
- Use certified seed mixes to limit the introduction of noxious weeds within 12 months of seed germination testing, and adjust seeding rates based on test results;
- Remove and dispose of excess mulch prior to seedbed preparation to prevent seed drills from becoming plugged and to ensure that seed incorporation can operate effectively;
- Re-apply and anchor temporary mulch, such as erosion control blankets, on the construction ROW following seeding;
- Seed at a rate appropriate for the region and for the stability of the reclaimed surface based on pure live seed;

- Use seeding methods appropriate for weather conditions, construction ROW constraints, site access, and soil types using drill seeding unless the ROW is too steep. Temporary cover crop seed shall be broadcast;
- Delay seeding until soil is in an appropriate condition for drill seeding;
- Use Truax or an equivalent-type drill seeder equipped with a cultipacker;
- Operate and calibrate drill seeders so that the specified seeding rate is planted using seed depths consistent with local or regional agricultural practices and row spacing that does not exceed 8 inches;
- Use broadcast or hydro-seeding in lieu of drilling at double the recommended seeding rates and use a harrow, cultipacker, or other equipment immediately following broadcasting to incorporate the seed to the specified depth and to firm the seedbed;
- Delay broadcast seeding during high wind conditions and when the ground is frozen;
- Hand rake all areas that are too steep or otherwise cannot be safely harrowed or cultipacked to incorporate broadcast seed to the specified depth;
- Use hydro-seeding on a limited basis, where the slope is too steep or soil conditions do not warrant conventional seeding methods; and
- Work with landowners to discourage intense livestock grazing of the construction ROW during the first growing season by using temporary fencing, deferred grazing, or increased grazing rotation frequency.

5.5.3 Additional Agency Proposed Mitigation Measures

No additional measures have been suggested by agencies regarding terrestrial vegetation.

5.6 WILDLIFE

5.6.1 Summary

Pipeline construction would result in short-term disturbance and long-term modification to wildlife habitats. Pipeline construction and associated access roads would increase habitat fragmentation by reducing the size of contiguous patches of habitat and by loss of habitat or changes in habitat structure. The pipeline ROW through native grassland, shrub, and forest communities would remove vegetation including sagebrush and native grasses, creating an unvegetated strip over the pipeline trench and adjacent construction areas. Subsequent revegetation may not provide habitat features comparable to pre-project conditions. Typically, seed mixes for reclamation include non-native species that quickly become established. Sagebrush often does not quickly become established on disturbed sites, especially if these sites are seeded with grasses and other species that more-rapidly germinate and grow. Management actions on the ROW include removal of trees and shrubs, likely including sagebrush. Loss of shrublands and wooded habitats would be long term (5 to 20 years) in reclaimed areas of the construction ROW. The total habitat loss is expected to be small in the context of total available habitat.

Potential impacts to wildlife during construction and operation of the Project and its connected actions include:

- Habitat loss, alteration, and fragmentation;
- Direct mortality during construction;
- Stress or avoidance of feeding due to exposure to construction and operations noise, and from increased human activity;
- Reduced breeding success from exposure to construction and operations noise, and from increased human activity;
- Reduced survival or reproduction due to decreased abundance of forage species or reduced cover;
- Direct mortality due to collision with or electrocution by electrical distribution lines; and
- Reduced survival and reproduction for ground nesting birds due to the creation of perches for raptors in grassland and shrubland habitats.

5.6.2 Planned Mitigation Measures

Keystone, power providers, and power transmission entities have committed to implementing the following measures to protect wildlife:

- Remove shavings produced during pipe bevel operation immediately to ensure that wildlife do not ingest this material;
- Collect and remove litter and garbage that could attract wildlife from the construction site at the end of the day's activities;
- Prohibit feeding or harassment of wildlife;
- Prohibit construction personnel from having firearms or pets on the construction ROW;
- Ensure all food and wastes are stored and secured in vehicles or appropriate facilities;
- Reseed disturbed native range with native seed mixes after topsoil replacement;
- Control unauthorized off road vehicle access to the construction ROW through the use of signs and access barriers;
- Develop a Migratory Bird Mitigation Plan in consultation with USFWS to avoid, minimize, and mitigate for impacts to migratory birds and migratory bird habitats;
- Develop construction timing restrictions and buffer zones through consultation with regulatory agencies;
- Prohibit cutting of active raptor nest trees during the nesting season;
- If construction would occur during the raptor nesting season during January to August, pre-construction surveys would be completed to locate active nest sites to allow for appropriate construction scheduling;
- Incorporate standard, safe designs, as outlined in Suggested Practice for Avian Protection on Power Lines into the design of electrical distribution lines in areas of identified avian concern;
- Incorporate standard raptor-proof designs, as outlined in Avian Protection Plan Guidelines into the design of the electrical distribution lines to prevent collision by foraging and migrating raptors; and

- Route electrical distribution lines and the 230-kV electrical transmission line such that they avoid areas with grouse leks, brood-rearing habitat, and wintering habitats that also support wintering raptors.

5.6.3 Additional Agency Proposed Mitigation Measures

The following additional potential mitigation measures have been suggested by regulatory agencies:

- Avoid ground disturbing activities or infrastructure placement within 1 mile of lek sites in Montana unless the lek is located along an existing road or corridor (Montana Fish Wildlife and Parks);
- Prior to construction through rocky outcrops in Montana, evaluate these habitats for bird, bat or reptile use including an evaluation for reptile hibernacula (Montana Fish Wildlife and Parks);
- Use a specialist that would be able to handle hibernating snakes in the event that they are overturned during construction activities on BLM lands in Montana (BLM);
- Consult with appropriate state wildlife agencies prior to initiation of maintenance activities beyond standard inspection measures or outside of the permanent ROW (DOS);
- Clean and/or decontaminate all equipment before entering areas either identified as sensitive habitats or new ROW (USFWS);
- On BLM managed lands, reclaim areas of previous shrub cover within the construction ROW and in temporary use areas with shrub cover (BLM); and
- Reduce the maximum maintained ROW through areas with big sagebrush, greasewood, and saltbush habitats (BLM).

5.7 FISHERIES

5.7.1 Summary

Possible impacts to fisheries could occur through siltation and disturbance of streams crossed by the proposed pipeline. Following the proposed mitigation procedures during construction would result in minor short-term impacts to aquatic habitats and organisms. Any short-term disturbance caused by instream activities likely would resemble natural high-flow events in the stream.

Possible impacts to fisheries resources through construction and operation of the Project and its connected actions include:

- Habitat loss, alteration, and fragmentation;
- Changes in the benthic invertebrate community;
- Increased water temperature through removal of vegetation and subsequent increased solar input;
- Introduction of non-native aquatic species which can compete with native species and transmit diseases;
- Direct mortality to fishery and aquatic resources during construction;

- Gill irritation, avoidance behaviors, and stress through the addition of suspended sediments to waterbodies;
- Interference with respiration in fish and invertebrates, leading to mortality or reduced productivity in rearing and spawning through excessive suspended sediments;
- Reduced population growth through sediment burial of eggs or young fish;
- Blockage or delays to normal fish movements through dam and pump crossing methods;
- Entrainment of eggs, small fish, and drifting macroinvertebrates during water withdrawals for hydrostatic testing; and
- Excessive noise, vibrations, and alteration of channel morphology through blasting.

5.7.2 Planned Mitigation Measures

To reduce the potential impacts to fisheries, Keystone would implement the following measures:

- Further define fish spawning periods and construction schedules to avoid, to the extent practicable, in-stream activities during sensitive periods;
- Use the HDD method to prevent direct disturbance to larger river habitats and the aquatic species that occupy those habitats;
- Complete most minor and intermediate waterbody crossings within 2 to 3 days;
- Cut vegetation off at ground level, leaving the existing root systems in place to provide streambank stability;
- Stabilize the stream and river banks with temporary sediment barriers within 24 hours of completing construction activities;
- Restore riparian vegetation with native plant species;
- Prevent use of herbicides within 100 feet of a wetland or waterbody;
- Restore stream channels and banks disturbed during construction; and
- Rehabilitate vegetative areas disturbed during construction.

5.7.3 Additional Agency Proposed Mitigation Measures

No additional measures have been suggested by agencies regarding fisheries resources.

5.8 THREATENED AND ENDANGERED SPECIES

5.8.1 Summary

There are 28 federally-protected threatened or endangered species and federal candidate species with the potential to occur in the Project area, including three mammals, seven birds, one amphibian, six reptiles, four fish, two invertebrates, and five plants. Of these, the Project is expected to have no effect to 14 species, and the Project may affect, but is not likely to adversely affect eight species. Only one species

has the potential to be adversely affected by the Project, the American burying beetle. Additional mitigation measures have been proposed to protect this species including setting up a compensatory mitigation plan for potential impacts to the American burying beetle by contributing to habitat conservation.

Possible impacts to threatened and endangered species through construction and operation of the Project and its connected actions include:

- Habitat loss, alteration, and fragmentation;
- Direct mortality during construction and operation;
- Stress or avoidance of feeding due to exposure to construction and operations noise, and from increased human activity;
- Reduced breeding success from exposure to construction and operations noise, and from increased human activity;
- Reduced survival or reproduction due to decreased abundance of forage species or reduced cover; and
- Direct mortality due to collision with or electrocution by electrical distribution lines or the 230-kV transmission line.

5.8.2 Planned Mitigation Measures

To reduce the potential impacts to threatened and endangered species, Keystone would implement where applicable of the following measures:

- Additional surveys for many species to discover the presence of the species themselves, or their nests/dens/habitat;
- If certain species were documented to be present within the Project area, additional mitigation measures would be developed in coordination with relevant agencies;
- Construction timing to occur outside of the breeding/denning/spawning season;
- If construction were to occur during the breeding season, for some species construction would be prohibited within a certain distance of active nest/den sites;
- Document the presence of some rare species that occur within the Project area;
- Construction workers would not be allowed to keep domestic pets in construction camps and/or worksites;
- Construction workers will not be allowed to feed wildlife;
- Use the HDD method to cross rivers with some listed species;
- Screen water intakes during water withdrawal for hydrostatic testing using an appropriate mesh size to prevent entrainment or entrapment of adult, juvenile and larval fish or other aquatic organisms;
- Control water withdrawal amounts and rates;
- Return the water used for hydrostatic testing to the original drainage;

- Limit the amount of vegetation clearing in sensitive areas;
- Implement erosion control measures;
- Reduce the width of the construction ROW in areas where listed plant populations have been identified, to the extent possible;
- Salvage and segregate topsoil appropriately where plant populations have been identified to preserve native seed sources in the soil for use in re-vegetation efforts in the ROW;
- Restore habitat by using an approved seed mix provided by the NRCS or appropriate state agency; and
- Collect seed to repopulate the ROW or an appropriate offsite location, or for creation of a nursery population until viable natural plant populations have established themselves; and
- Keystone would inform electrical power providers of the requirements for ESA consultations with the USFWS for the electrical infrastructure components constructed for electrical distribution lines serving the Project as well as the 230 kV transmission line to prevent impacts to threatened and endangered species.

5.8.3 Additional Agency Proposed Mitigation Measures

The following additional potential mitigation measures have been suggested by regulatory agencies:

- For the Steele City Segment, if construction occurs after April 15, pre-construction surveys would occur no more than 2 weeks prior to construction within 0.25 mile from suitable breeding habitat for interior least terns at the Platte, Loup, and Niobrara rivers in Nebraska; the Cheyenne River in South Dakota; or the Yellowstone River in Montana (USFWS);
- For the Gulf Coast Segment, if construction occurs after April 15, -construction surveys would occur no more than 2 weeks prior to construction within 0.25 mile from suitable breeding habitat for interior least terns at the North Canadian River and South Canadian River in Oklahoma and the Red River at the Oklahoma/Texas border (USFWS);
- Construction would not be permitted within 0.25 mile from an occupied interior least tern nest site during the breeding season (April 15 through August 15) or until the fledglings have left the nesting area (USFWS);
- If construction were to occur during the piping plover breeding season (April 15 through August 15), Keystone would conduct pre-construction surveys within 0.25 mile from suitable breeding habitat at the Niobrara, Loup, and Platte rivers in Nebraska, no more than 2 weeks prior to construction (USFWS);
- If occupied piping plover nests are found, then construction within 0.25 mile of the nest would be suspended until the fledglings have left the nest area (USFWS);
- If a piping plover lands in close proximity to the construction ROW during construction, its presence would be documented (USFWS);
- If a whooping crane lands in close proximity to the ROW during construction, its presence should be documented and appropriate mitigation measures implemented to prevent direct impacts (USFWS);
- Recommended mitigation measures for American burying beetle impacts include setting up a compensatory mitigation plan for potential impacts to the American burying beetle in Tripp

- If surveys on route changes indicate the presence of the American burying beetle along the Project ROW in Nebraska, Keystone would implement trap and relocate measures in those areas prior to construction activities (USFWS);
- If the route changes and future surveys indicate the presence of the American burying beetle in Lamar County, Texas, bait away or trap and relocate efforts would be undertaken prior to construction activities (USFWS);
- The construction camp near Winner, South Dakota, should be built on cropland very close to Winner, and/or north of Highway 18 in Tripp County (Pierre, South Dakota USFWS Field Office);
- The two pipe stockpile sites planned for Tripp County should be placed on cropland, or north of Highway 18 (Pierre, South Dakota USFWS Field Office);
- The Gregory County, South Dakota contractor yard should be built on cropland, or north of Highway 18 (Pierre, South Dakota USFWS Field Office); and
- Because the American burying beetle is attracted to light at night, working at night with lights in southern Tripp County should be avoided. If working at night cannot be avoided, lighting should only be used between September 1 and June 1 (Pierre, South Dakota USFWS Field Office).

5.9 LAND USE, RECREATION AND SPECIAL INTEREST AREAS, AND VISUAL RESOURCES

5.9.1 Summary

Agricultural, rangeland, forestland, recreational/special use, commercial, and residential land use classes would be affected in areas intersected by the proposed ROW. The largest amount of acreage that would be affected by the Keystone Project would be agricultural land, followed by rangeland.

Possible impacts to land use through construction and operation of the Project and its connected actions include:

- Loss of agricultural productivity and crop loss;
- Impacts to soil profiles including topsoil degradation, soil compaction, and rock introduction or redistribution;
- Potential damage to drain tiles or other irrigation systems;
- Livestock harassment or injury;
- Fence damage or removal;
- Removal of trees in forested areas;
- Introduction of slash along the Project ROW;
- Changes to flow rates within affected waterbodies;
- Changes to hydrological and vegetation characteristics of wetland areas;

- Increases in turbidity within waterbodies as a result of construction;
- Introduction of fill materials into wetland areas; and
- Some current land uses would be converted to long-term utility use.

Possible impacts to recreation and special interest areas and visual resources through construction and operation of the Project and its connected actions include:

- Visual impacts from the removal of vegetation within the ROW, pipeline excavation, and general construction activity;
- Increased noise and dust;
- Construction activities would temporarily affect recreational traffic and use patterns in special management and recreational areas;
- Sightseers, hikers, wildlife viewers, fishers and hunters, and other recreationists would be temporarily dislocated; and
- The proposed electrical distribution lines and 230-kV transmission line could generate adverse impacts on visual resources due to their high visibility.

5.9.2 Planned Mitigation Measures

To reduce the potential impacts to land use, Keystone, power providers and power transmission entities would implement the following measures:

- Implement soil protection measures listed in Sections 5.2. and 5.5;
- Prevent stoppage or obstruction of irrigation systems except during pipeline installation periods through irrigated areas;
- Keep pipeline installation periods in irrigated areas as short as practicable;
- Repair or restore drain tiles;
- Restore farm terraces to their pre-construction functions;
- Restore disturbed areas with custom seed mixes (approved by landowners and land managers) to match the native foliage;
- Provide access to rangeland during construction to the extent practicable;
- Install temporary fences with gates around construction areas to prevent injury to livestock or workers;
- Leave in place hard plugs install soft plugs to allow livestock and wildlife to cross the trench safely;
- Remove litter, garbage, and any pipeline shavings at the end of each construction day, to protect livestock from accidental ingestion;
- Prohibit construction personnel from feeding or harassing livestock;
- Prohibit construction personnel from carrying firearms or pets into the construction area;
- Secure rangeland fences to prevent drooping;

- Close any openings in the fence at the end of each day to prevent livestock escape;
- Maintain all existing improvements such as fences, gates, irrigation ditches, cattle guards, and reservoirs to the degree practicable;
- Return any damaged improvements to at least their condition prior to construction;
- Repair fences either using original material or high quality new material;
- Compensate landowners for demonstrated decreases in land productivity resulting from Project-related soil degradation;
- Compensate land owners for yields less than those on unaffected lands that result from Project impacts;
- Wherever practical, place new power distribution lines along existing county roads, section lines, or field edges to minimize interference with adjacent agricultural lands;
- Protect waterbodies and wetlands using the measures outlined in Sections 3.3 and 3.4;
- Protect forest resources using the measures outlined in Section 3.5;
- Before construction begins, Keystone would conduct surveys to confirm the location of buildings relative to the pipeline and to ascertain whether the buildings are occupied residences or businesses;
- Create site-specific protective constructions plans for residential and commercial/industrial structures within 25 feet of the construction ROW;
- Control noise levels during non-daylight hours in compliance with any applicable noise regulations around residential and commercial/industrial areas;
- Limit the hours that activities with high noise levels occur;
- Coordinate schedules to expedite the construction work through the area;
- Provide vehicle access and assist in traffic flows in construction areas (including emergency vehicles); and
- Install plating to cover open trenches during non-construction times in developed areas.

To reduce the potential impacts to recreation and special interest areas and visual resources, Keystone, power providers and power transmission entities would implement the following measures:

- Consider preserving landscaping and mature trees in some cases;
- Cooperate with local agencies to reduce the conflict between recreational users and Project construction;
- Adjust routing to reduce adverse aesthetic features where possible;
- Implement measures to reduce long term visual impacts;
- Paint aboveground facilities in accordance with standard industry painting practices
- Consult with landowners to address any visual aesthetic issues; and
- Consult with the Lower Brule Tribe regarding the location of the new 230-kV transmission line.

5.9.3 Additional Agency Proposed Mitigation Measures

There are no additional mitigation measures proposed by agencies with regard to land use, recreation and special interest areas and visual resources.

5.10 SOCIOECONOMICS

5.10.1 Summary

The proposed pipeline has the potential to generate substantial direct and indirect economic benefits for local and regional economies along the pipeline route. During construction, these benefits are derived from the construction labor requirements of the Project and spending on construction goods and services that would not otherwise have occurred if the Project was not built. At the local level, these benefits would be in the form of employment of local labor as part of the construction workforce and related income benefits from wage earnings, construction expenditures made at local businesses, and construction worker spending in the local economy.

A peak workforce of approximately 5,000 to 6,000 personnel would be required to construct the entire Project and it is estimated that 4,500 to 5,100 non-local residents would temporarily move into the region of influence, resulting in short-term population increases during the construction period. Keystone is expected to utilize temporary local construction labor where possible and it is estimated that approximately 10 to 15 percent (50 to 100 people per spread) could be hired from the local work force for each spread, although this may not be possible in rural areas. Non-local construction workers moving into the region of influence would require short-term accommodations such as hotels/motels, RV sites and campgrounds. In remote areas there may be a need to construct temporary construction camps to house workers, which would be permitted, constructed, and operated in compliance with applicable county, state, and federal regulations.

Potential impacts to socioeconomic resources during construction and operation of the Project and its connected actions include:

- Possible increased demands for permits for vehicle load and width limits;
- Short-term impacts to traffic and transportation infrastructure: some temporary traffic delays likely;
- Short-term population increases during construction with the influx of construction workers and Project staff;
- Short-term shifting in local job distribution may occur in all areas;
- Possible short-term labor shortages in other areas of local economies due to workers leaving existing jobs for jobs on the Project;
- Generation of substantial expenditures on goods and services, both inside and outside of the region of influence;
- Secondary short-term benefits of increased business to local and statewide businesses including equipment suppliers, restaurants, gas stations and hotels;
- “Multiplier effects,” resulting from businesses buying from other businesses generating additional economic benefits within the region of influence;

- Short-term tax revenues generated during construction;
- Long-term tax revenues associated with property tax payments;
- Temporary increase in demands for emergency response, medical, police, and fire protection services during the construction period; and
- Possible additional demands on local public services;
- Generation of long-term property tax revenues for the states and counties traversed by the pipeline, in accordance with applicable tax structures; and
- An estimated \$138.4 million in annual property tax revenues would be generated by the Project in the region of influence.

The Project is not expected to result in adverse impacts that would fall disproportionately on minority or low-income populations located along the pipeline route.

5.10.2 Planned Mitigation Measures

The following measures would be implemented to reduce impacts to socioeconomic resources:

- Carry out public outreach throughout the life of the Project, including in areas where low-income populations and/or minority populations have the potential to be affected;
- Provide vehicle access and assist traffic flows in construction areas including emergency vehicles;
- Comply with the requirements of road crossing permits and approvals for construction across roads and highways;
- Attempt to hire temporary construction staff from the local population;
- Work with local law enforcement, fire departments, and emergency services providers, including medical aid facilities, to establish appropriate measures that would ensure effective emergency response and provision of related services;
- Compensate property owners for any damages caused by Project construction;
- Repair or restore drain tiles, fences, and land productivity if these are damaged or adversely affected during construction;
- Use detours for traffic or keep one lane of traffic open other than when it would be necessary to close the road completely to install the pipeline to prevent undue disruption to traffic movements; and
- Post signs and utilize other measures as required by federal, state, and local transportation agencies to minimize traffic disturbances and ensure safety.

5.10.3 Additional Agency Proposed Mitigation Measures

No additional measures have been suggested by agencies regarding socioeconomic resources.

5.11 CULTURAL RESOURCES

5.11.1 Summary

Section 106 of the NHPA, as amended, requires the lead federal agency to assess effects to historic properties within the area of potential effect for the Project before that undertaking occurs. A historic property is defined as a cultural resource, such as a district, archeological site, building, structure, or object (including a traditional cultural property and/or sites of cultural and religious importance) that is listed, or eligible for listing, in the NRHP. Keystone, through its contractors, has examined those portions of the Project for which survey permission was obtained. There is a Programmatic Agreement that has been drafted to provide further protection of historic properties that the Applicant has not completed field surveys for, after the FEIS is completed (See Appendix S).

Through July 2009, 190 cultural resources were identified during the cultural resource inventory in Montana, of which 134 were archaeological sites, 15 were historic structures, and 41 were isolated finds. In South Dakota, 71 cultural resources were identified during the cultural resource inventory including 71 cultural resources, 31 archaeological sites, 9 historic structures, and 31 isolated finds. In Nebraska the number of cultural resources identified was 68 of which 50 were archaeological sites, 17 were historic structures, and one was an isolated find. No new sites were identified at the proposed pump station locations in Kansas. Through July 2009, 81 cultural resources were identified in Oklahoma, including 41 archaeological sites, 22 historic structures, and 18 isolated finds. Since then, additional cultural resource surveys have been conducted in Oklahoma but the reports have not yet been received by DOS. In Texas, as of July 2009, 80 cultural resources were identified, of which 42 were archaeological sites, 16 were historic structures, and 22 were isolated finds. No cultural resources were identified in the Houston Lateral section. Since then, additional cultural resource surveys have been conducted in Texas but the reports have not yet been received by DOS.

Potential impacts to cultural resources during construction and operation of the Project and its connected actions include:

- Physical destruction or damage to all or part of a property caused by pipeline trenching or related excavations or boring;
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of a property's significant historic features by short-term construction or construction of above ground appurtenant facilities and roads; and
- Change of the character of a property's use or of physical features within the property's setting that contribute to its significance.

5.11.2 Planned Mitigation Measures

To reduce impacts to cultural resources, Keystone, power providers and power transmission entities would implement the following measures:

- Further assess cultural resources that are considered "unevaluated" through NRHP evaluation procedures;
- Avoid a property through route variation or feature relocation, abandonment, bore or HDD, by narrowing the construction corridor, or by limiting impacts along access roads to the existing roadway;

- Implement measures such as the use of construction mats to reduce short-term construction-related impacts to properties;
- Develop a Memorandum of Agreement (MOA) during consultation that includes a mitigation plan for adversely affected historic properties;
- Prepare Unanticipated Discovery Plans for Montana, South Dakota, Nebraska, Kansas, Oklahoma, and Texas and the Lower Brule Sioux Reservation;
- Hold public and agency meetings to keep agencies, tribes and the public informed throughout the EIS process. Also hold Section 106 Government-to-Government Consultation meetings and
- Consult with the Lower Brule Tribe and Basin Electric and Western regarding the location of the new 230-kV transmission line.

5.11.3 Additional Agency Proposed Mitigation Measures

No additional measures have been suggested by agencies regarding cultural resources.

5.12 AIR AND NOISE

5.12.1 Summary

Air emissions typically would be localized, intermittent, and short term since Project construction would move through an area relatively quickly. Emissions from fugitive dust, construction equipment combustion, open burning, and temporary fuel transfer systems and associated tanks would be controlled to the extent required by state and local agencies. Emissions from construction-related activities would not significantly affect local or regional air quality. Project operations would not produce significant air quality impacts, and only minor emissions from the backup gasoline generator and fugitive emissions from valves, tanks, and pumping equipment would occur.

Potential impacts to air quality during construction and operation of the Project and its connected actions include:

- Release of fugitive dust resulting from land clearing, grading, excavation, concrete work, blasting and dynamiting, and vehicle traffic (including construction camp traffic) on paved and unpaved roads;
- Emissions from fossil-fueled (diesel or gasoline) construction equipment such as construction camp generators, large earth-moving equipment, skip loaders, trucks, non-road engines, and other mobile sources;
- Combustion emissions including NO_x, CO, VOCs, SO₂, PM₁₀, PM_{2.5}, and small amounts of HAPs;
- Emissions from open burning;
- VOC emissions from temporary fuel transfer systems and associated storage tanks;
- Minimal fugitive emissions from crude oil pipeline connections and pumping equipment at the pump stations;
- Minimal emissions from mobile sources; and

- VOC and HAP emissions from the crude oil storage tank at the Steele City tank farm.

Construction would increase noise levels in the vicinity of Project activities. Noise levels would vary during the construction period, depending upon the construction phase. Residential, agricultural, and commercial areas within 500 feet of the Project ROW would experience short-term inconvenience from construction equipment noise.

During operation of the pipeline, the noise associated with the electric pump stations would be limited to the immediate vicinity of the facilities and are projected to be minor. Project-related operations are not expected to result in a significant effect on the noise environment.

Potential impacts to noise during construction and operation include:

- Increased noise levels in the vicinity of Project activities;
- Short term, localized, and intermittent construction noise;
- Short-term inconvenience from construction equipment noise to residential, agricultural, and commercial areas within 500 feet of the ROW;
- Temporary and intermittent construction noise levels generally limited to daylight hours that would attenuate with distance; and
- Minor noise levels associated with the operation of pump stations that would attenuate to existing ambient noise levels (40 to 45 dBA) within approximately 2,300 feet of the facility.

5.12.2 Planned Mitigation Measures

To reduce impacts to air quality, the following measures would be implemented:

- Apply water sprays and surfactant chemicals, and stabilize disturbed areas to control fugitive dust;
- Place curtains of suitable material to prevent wind-blown particles from sand blasting operations from reaching any residence or public building;
- Comply with the EPA mobile source regulations in 40 CFR Part 86 for onroad engines and 40 CFR Part 89 and 90 for nonroad engines;
- Maintain all fossil-fueled construction equipment in accordance with manufacturer's recommendations;
- Obtain all necessary open burning permits, approvals, and notifications prior to conducting any open burning of land clearing materials;
- Follow all open burning regulations including restrictions on burn location, material, and time, as well as consideration of local air quality;
- Carry out burning within the ROW in small piles to avoid overheating of or damage to trees or other structures;
- Store and use diesel fuel with a low vapor pressure, minimizing releases of VOCs; and
- Evaluate emissions of ozone precursor compounds (NO_x and VOCs) against the General Conformity applicability threshold levels and nonattainment area emissions budget.

Additionally, various actions could be used to mitigate emissions during construction activity in Texas. These may include the following:

- Utilize construction contractors that participate in the Texas Emission Reduction Plan (TERP) grant program or require contractors to apply for TERP grant funds;
- Give preference through the bidding process to “Green/Clean” Contractors;
- Require construction contracts to use diesel fuels that meet the Texas Low Emission Diesel (TxLED) standards; and
- Require construction contractors to use Best Management Practices (BMP) in relation to air quality.

The following measures would be implemented to reduce noise impacts:

- Develop site-specific noise mitigation plans to comply with any specific regulations and obtain any applicable authorizations or variances, if local noise regulations exist;
- Provide noise mitigation plans to the construction contractors for implementation and enforcement by construction inspectors using portable sound meters;
- Give advanced notice to landowners prior to construction;
- Limit the hours during which construction activities with high-decibel noise levels are conducted in residential areas;
- Coordinate work schedules to minimize disruption in residential areas;
- Plan for expedited construction through residential areas;
- Set up a toll-free telephone line for landowners to report any construction noise-related issues;
- Perform a noise assessment survey during operations in locations where nearby residents express concerns about pump station noise;
- Construct berms or plant vegetation screens around the facilities as noise abatement measures, if needed.
- Turn off equipment when not in use and reduce idling time;
- Use temporary equipment enclosures and noise barriers;
- Limit haul trips and construction to daylight hours where feasible;
- Use best available noise control techniques such as mufflers, intake silencers, ducts, engine closures, and acoustically attenuating shields or shrouds for all construction equipment and trucks;
- Use C-filters on communication systems; and
- Additional Agency Use lightning arrestors and assure all hardware has a tight fit to reduce Radio Frequency Interference (RFI).

5.12.3 Proposed Mitigation Measures

No additional measures have been suggested by agencies regarding air quality or noise.

5.13 RELIABILITY AND SAFETY

5.13.1 Summary

The pipeline system would be designed, constructed, and maintained in a manner that meets or exceeds industry standards and regulatory requirements and would be built within an approved ROW. To prevent potential oil spills during pipeline construction, measures would be implemented at each construction or staging area where fuel, oil, or other liquid hazardous materials are stored, dispensed, or used.

Signage would be installed at all road, railway, and water crossings indicating that a pipeline is located in the area to help prevent third-party damage or impact to the pipeline. Keystone would ensure safety near its facilities through a combination of programs encompassing engineering design, construction, and operations, public awareness and incident prevention programs, and emergency response programs.

The reliability and safety of the Project can be expected to be well within industry standards. Further, the low probability of large, catastrophic spill events and the routing of the pipeline to avoid most sensitive areas suggest a low probability of impacts to human and natural resources. Nevertheless, some potential for construction- and operations-related spills can be expected. Oil spills can occur through the following ways:

- Construction spills: these are generally small, and composed of refined products (e.g., gasoline, diesel, and lubricating and hydraulic fluids). Most result from vehicle and construction equipment fueling and maintenance;
- Tanker and fuel or maintenance truck accidents or fuel storage tank failures: these would be the most likely sources of larger construction spills. The potential maximum oil spill volume from these sources would be about 143 bbls (6000 gallons) for diesel or gasoline and about 8 bbls (330 gallons) for lubricating or hydraulic fluid (i.e., six 55-gallon barrels on a pallet);
- A pipeline or storage tank pinhole leak: a small leak could potentially be undetectable for days or weeks. Although leak detection systems would be in place, some leaks might not be detected by the system;
- A pipeline or storage tank break: the point of release may be relatively remote and hard for responders to quickly access. Spill locations could include the pipeline ROW, pump stations, tank farm, and construction and contractor staging areas; and
- Pipeline operation leaks, drips, and spills: these can occur due to corrosion, damage caused by third parties performing excavation or soil borings, external forces due to landslides or washouts, or other causes.

When an oil spill occurs, the resulting environmental impact depends on a number of factors, including the fate and behavior of the spilled oil (i.e., the potential for a spill reaching an environmental receptor); the concentration, chemical composition, and physical characteristics of the oil; and the toxicity of the oil to the receptor. Impacts related to oil spills can be affected by the release location, type of oil released, volume of oil released, nearby receptors and resource uses, seasonal variations, response time and response actions, weather, water levels, and other factors.

Potential impacts from oil spills during construction and operation of the Project and its associated actions include:

- Smothering living organisms so they cannot feed or obtain oxygen;

- Coating feathers or fur, which reduces insulating efficiency and results in hypothermia;
- Adding weight to an organism so that it cannot move naturally or maintain balance;
- Coating sediments and soils, which reduces water and gas (e.g., oxygen and carbon dioxide) exchange and affects subterranean organisms;
- Coating beaches, water surfaces, wetlands, and other resources used by people which may result in offensive odors, visual impacts and soiling of humans, animals, habitats and equipment;
- Toxicological impacts including direct and acute mortality; sub-acute interference with feeding or reproductive capacity; disorientation; narcosis; reduced resistance to disease; tumors; reduction or loss of various sensory perceptions; interference with metabolic, biochemical, and genetic processes; and a host of other acute or chronic effects;
- Loss or reproductive impairment of a significant portion of a population or biological community from an oil spill;
- Localized and transient effects to air quality through evaporation of the lighter hydrocarbon fractions including escapement of volatile organic compounds (VOCs);
- Damage to paleontological resources through oil spill or clean up;
- Localized reduction in mineral and fossil fuel resource availability;
- Contamination of soil resources through oil spill or clean up;
- Oil deposited on and remaining in the top sediment layer, especially in aerobic environments, potentially affecting the benthic biological community until biodegradation by microbes reduces long-term impacts;
- Spills reaching and affecting wetlands and ponds, as well as creeks and rivers before spill response is initiated or completed causing reduced DO concentrations and increased toxicity to aquatic organisms;
- Spills reaching larger rivers and lakes resulting in minimal effects on water quality since DO levels would not be affected and direct toxicity would be minimal because of the high dilution volume in these waterbodies;
- Affects to drinking water sources and irrigation water supplies;
- Minor short to long-term surface water and/or groundwater quality degradation from sporadic equipment and vehicle spills or leaks;
- Diesel fuel dispersal in the groundwater, contaminating the groundwater for agricultural or domestic drinking supply uses;
- Aggressive and intrusive cleanup methods that mix oil with water and sediments where the oil may have long-lasting impacts on wetlands;
- Vegetation injury, mortality or coating with oil;
- Direct mortality to wildlife and damage to its habitat from exposure to toxic materials or crude oil releases;
- Bird mortality or hypothermia from direct contact with oil;
- Mortality of bird eggs due to secondary exposure by oiled brooding adults; loss of ducklings, goslings, and other non-fledged birds due to direct exposure; and lethal or sub-lethal effects due to direct ingestion of oil or ingestion of contaminated foods;

- Direct or indirect impacts to mammals through impacts to their habitat or prey;
- Impacts to fish, macroinvertebrates (e.g., mussels, crustaceans, insects, and worms), algae and other aquatic plants, amphibians, and reptiles through changes in overwintering and spawning behavior, reduction in food resources, entrapment in oil; toxic or physical smothering; consumption of contaminated prey, temporary displacement, and changes in growth, feeding, fecundity, and survival rates;
- Loss of individuals of threatened and endangered species and habitat damage due to exposure to toxic materials or crude oil releases;
- Short-term disruption in local agricultural production resulting from a spill that enters agricultural lands or wild lands used by grazing livestock;
- Affects to fishing, boating, kayaking, tubing, camping, scenic values, and other recreational pursuits due to an oil spill in a riverine environment that is used by recreationists;
- Long-term effects to recreation resources possibly including reduction or loss of fishing and diminished scenic value of the area, as oil residue could take one to several years to weather;
- Damage to the historic values of National Historic Trail systems; and
- Response to oil spills generating positive local economic activity for the duration of the spill response activity.

5.13.2 Planned Mitigation Measures

Keystone has designed and committed to a comprehensive slate of processes, procedures, and systems to prevent, detect, and mitigate potential oil spills that may occur during operation of the proposed pipeline. The Final ERP would contain further detail and would be approved by PHMSA-OPS prior to their grant of permission to Keystone to operate the proposed pipeline.

- Keystone has developed and implemented safeguards after conducting a pipeline threat analysis using the pipeline industry-published list of threats under ASME B31.8S and also using threats identified by PHMSA to determine the applicable threats to the proposed pipeline.
- Keystone would utilize a comprehensive SCADA system to monitor and control the proposed pipeline. Data provided by the SCADA system would alert the Operations Control Center (OCC) operator to an abnormal operating condition, indicating a possible spill or leak. A back-up communication system also would be available should SCADA communications fail between field locations and the OCC.
- ERP and SPCC standard operating and response procedures would be utilized by the OCC operator in responding to abnormal pipeline conditions, including leak alarms. The OCC operator would have the full and complete authority to execute a pipeline shutdown.
- Keystone has designed the Project to either meet or exceed applicable federal pipeline safety standards.

To reduce the potential for and impacts of spills, the following measures would be implemented:

- Provide a secondary means of containment (berms) for 110 percent of the capacity of the largest oil storage tank;

- Inspect storage sites for compliance with a 100-foot setback from the water's edge (carried out by the EI);
- Address specific preventive and mitigating measures for potential spills from construction activities in the ERP;
- Store materials in containers with discrete capacities that define worst case maximum spill quantities;
- Carry out spill prevention, control, and containment (SPCC) plans;
- Restrict the locations of hazardous materials;
- Place signs a minimum of 100 feet from the boundaries of all wetlands and waterbodies prior to construction to ensure compliance with the 100-foot setback requirement for placement of fuel or oil storage tanks unless otherwise authorized by the EI;
- Carry out aerial and ground patrols to provide direct observation and identification of potential leak locations;
- Carry out internal pipeline inspection surveys (pigging operations);
- Inspect construction equipment for fluid leaks prior to entering or crossing over waterbodies;
- Conduct refueling and lubricating of construction equipment in upland areas at least 100 feet away from perennial streams and wetlands;
- Place stationary equipment within a secondary containment if it would be operated or refueled within 100 feet of a wetland or waterbody boundary;
- Place fuel tanks or fuel trailers within secondary containment structures equipped with impervious membrane liners;
- Prohibit storage of hazardous materials, chemicals, fuels, lubricating oils, and any concrete coating activities within a wetland or within 100 feet of any wetland boundary, if possible;
- Base emergency responders and store adequate spill clean up equipment in appropriate locations;
- Carry an oil spill response kit and spill response equipment onboard any fuel truck that transports and dispenses fuel to construction equipment or Project-related vehicles at all times;
- Carry out regular spill training exercises and drill programs for personnel;
- Clean up any incidental spills consistent with the SPCC plans; and
- Carry out protocols defined in the Section 106 NHPA PA for any potential cultural resources encountered during a spill or associated cleanup activities.

5.13.3 Additional Agency Proposed Mitigation Measures

Perform any other procedures mandated by PHMSA in the event that PHMSA approves a special permit related to maximum operating pressures for the pipeline system.